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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

FETZNER, TIFFANY A

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2831

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/527,592	Applicant(s) SODICKSON ET AL.	
	Examiner Tiffany A. Fetzner	Art Unit 2831	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-119 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-119 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-119 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 March 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Continued examination

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 12, 2008 has been entered.

Response to Arguments

3. Applicant's arguments filed December 12, 2008 have been fully considered but they are not persuasive. Applicant's arguments with respect to claims 1-119 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

4. **Claims 68, 69, 71-90** are objected to because of the following informalities:
A) Applicant canceled **claim 62** in the December 10, 2008 amendment and response, however applicant failed to correct the dependency chain of the subsequent dependent claims 63-90 which each depend in some way from **canceled claim 62**. Therefore dependency corrections are required with respect to each of **claims 68, 69, 71-90** appropriate correction is required.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:
Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.
6. **Amended Claims 1, 3-32, 61, 63-90, 117-119** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.
A process is statutory if it requires physical acts to be performed outside the computer

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independent of and *following* the steps to be performed by a programmed computer, where those acts involve the manipulation of tangible physical objects and result in the object having a different physical attribute or structure (see MPEP 2106). A claim is limited to a practical application when the method, as claimed, produces a *concrete, tangible and useful result*; i.e., the method recites a step or act of producing something that is *concrete, tangible and useful*. Referring to the "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" in determining whether the claim is for a "practical application," the focus is not on whether the steps taken to achieve a particular result are useful, tangible and concrete, but rather that the *final result* achieved by the claimed invention is "useful, tangible and concrete." (<<http://www.uspto.gov/web/offices/com/sol/og/2005/week47/patgupa.htm>>)

The claimed methods of **claims 1, 61, 117**, and its corresponding dependent **claims 3-32, 63-90, 118-119** perform method processes for operating a magnetic resonance system / device / apparatus, which acquire resonant properties from a body positioned proximate an array of coils, having a plurality of resonant coils, each having one or more resonant properties including a resonant frequency ..., however after the detecting a change in the resonant frequency of at least one of the resonant coils in the array resulting from the presence of the body and determining at least one electromagnetic property of at least one region of the body from the change in the resonant frequency of the at least one resonant coil the method stops. No actual information or image is presented to a user nor does a physical transformation occur outside of a computer as a result. At least one property is determined, but nothing is done with it. The claim as written performs the function of the claim for no purpose, because there is no final utilized result. The claims do not produce a **concrete, tangible and useful** result.

Additionally with respect to amended apparatus of **claims 61** and its corresponding dependent claims and **63-90**, these claims have the additional problem, of intended use issues, and of not setting forth the specifics of the adaptation provided in independent claim 61. Therefore the subject matter claimed is considered non-statutory.

With respect to computer implementation **claims 117-119**, these claims are considered to be nonstatutory by the examiner, because the results they obtain in the course of the method steps are never provided to a two user, or a screen, or any physical tangible component. Any results obtained are left in the computer, which does not constitute a concrete tangible and useful result. Any results obtained must be utilized in the real world or produce some type of tangible concrete useful result in order to be statutory, since in general abstract ideas or rules to a game or directions on recipe are also not statutory unless an actual concrete tangible useful result is obtained from them.

Election/Restrictions

7. This application contains claims directed to the following patentably distinct species **A)** method **Claims 1, 3-32**; and corresponding apparatus claims **61, 63-90** where the novelty recited is based on the detection of the change in though resonant

frequency of at least one of the resonant coils in the resonant coil array resulting from the presence of a body in proximity to the coil array.

B) method **Claims 33-60**, and corresponding apparatus claims **91-116** where the property being measured results from at least two of a resistant coupling, a capacitive coupling, and an inductive coupling between at least two of the plurality of coils as a result of operating at least one of the at least two of the plurality of coils. There is no resonant frequency change in these recited claims.

C) **Claims 117-119** where the novelty is the software of a “computer readable medium encoded with instructions, that is capable of being executed on at least one processor or electromagnetic model of the coil array capable of generating a trial impedance matrix that simulates the impedance responds of the coil array based on an electromagnetic properties assigned low-volume corporate in the model receives a measured impedance matrix of the coil array measured impedance matrix are presenting impedance measurements of the coil array obtained by operating at least one of the plurality of coils in the coil right; logically petitioning the volume associated with the model of the coil array and the body into a plurality of regions assigning trial values respectively to each of the plurality of regions, the trial values representing initial guesses for values of the one of conductivity permittivity and permeability for each of the plurality of regions; generating a trial impedance matrix from the assigned trial values according to the electromagnetic model of the coil array; and reducing the distance between the trial impedance matrix and the measured impedance matrix. The Examiner notes that this computer claim lacks a concrete useful in tangible result, because all generated results remain within the computer system and are not provided to a specific user

8. The species are independent or distinct because claims to the different species recite the mutually exclusive characteristics of such species. In addition, these species are not obvious variants of each other based on the current record.

9. Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claims are considered to be generic.

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10. There is an examination and search burden for these patentably distinct species due to their mutually exclusive characteristics. The species require a different field of search (e.g., searching different classes/subclasses or electronic resources, or employing different search queries); and/or the prior art applicable to one species would not likely be applicable to another species; and/or the species are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

11. **Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species to be examined** even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected species**, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

12. The election of the species may be made with or without traverse. To preserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the election of species requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected species.

13. Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the species unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other species.

14. Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141.

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15. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 102

16. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

17. **Amended Claims 33-60, 91-116** are still rejected under **35 U.S.C. 102(e)** as being anticipated by **Mills** US patent **6,477,398 B1** issued November 5th 2002, filed November 12th 1998.

With respect to Amended **Claim 33 Mills**, shows with respect to figures 1 through 13 and their accompanying description within the Mills disclosure “A method of determining one or more properties” (i.e. such as magnetic susceptibility, external or internal resonant frequency shift, Larmor frequency shift, etc.,) “of a body” (i.e. of a patient or object), “the method comprising acts of: positioning the body proximate a plurality of coils;” [See figures 1a, 1b, 8, 13 and accompanying description] “measuring at least one property of at least one of the plurality of coils;” [See figures 1a, 1b, 8, 13 and accompanying description, the abstract, and the text of col. 30 line 5 through col. 32 line 46; especially col. 30 lines 18-66] “, the at least one property resulting from at least two of a resistive coupling, a capacitive coupling, and then conduct of coupling between at least two of the plurality of coils as a result operating at least one of the at least two of the plurality of coils; [See figures 1a, 1b, 8, and 13, which show the resistive and inductive couplings between the coils.] “and determining at least one electromagnetic

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property” (i.e. the magnetic susceptibility) “of at least one region of the body” (i.e. the magnetic susceptibility measured / detected in a specific region of a body is a magnetic susceptibility map) [See abstract, col. 30 line 5 through col. 32 line 46] which is determined “from the at least one property” [See abstract, col. 2 line 27 through col. 4 line 65] ~~“based on at least two of a resistive coupling, a capacitive coupling, and an inductive coupling between at least two of the plurality of coils.”~~ [See figures 1a, 1b, 8, and 13, which show the resistive and inductive couplings between the coils.]

With respect to Amended **Claim 91 Mills**, shows with respect to figures 1 through 13 and their accompanying description within the Mills disclosure “An apparatus for determining one or more properties of a body, the apparatus comprising: a plurality of coils;” [See figures 1a, 1b, 8, and 13] These figures show, in combination with their accompanying description of the **Mills** disclosure “a first component coupled to the plurality of coils, the first component adapted to provide at least one measurement of at least one property of the plurality of coils; and a second component coupled to the first component to receive the at least one measurement, the second component adapted to determine at least one electromagnetic property of at least one region of the body from the at least one measurement” [See the **rejection of claims 1, 33, and 61**, based on at least two of a resistive coupling, a capacitive coupling, and an inductive coupling between two or more of the plurality of coils.” [See also the abstract, and the text of col. 11 line 66 through col. 81 line 14 with respect to the figures and the functions of the shown components.]

With respect to **Claim 34**, and **corresponding claim 92** which depend from **independent claims 33, and 91** respectively: **Mills** teaches “determining at least one of a conductivity, a permittivity, and a permeability of the at least one region of the body.” [See col. 4 lines 46-51] The same reasons for rejection, which apply to **claims 33, 91** also apply to **claims 34, and 92** and need not be reiterated.

With respect to corresponding **Claims 35, 36, and amended claim 93** which depend from **independent claims 33, and 91** respectively: **Mills** teaches “determining at least one of a magnitude, a direction, and a phase of an electromagnetic (i.e. electric **claims 35, 93**) and (i.e. magnetic **claim 36, 93**) field at the at least one region of the

body.” [See col. 6 line 16 through col. 10 line 21] The same reasons for rejection, which apply to **claims 33, 91** also apply to **claims 35, 36, and amended claim 93** and need not be reiterated.

With respect to **Claim 37, Mills** teaches “forming an image having a plurality of voxels, each voxel of the plurality of voxels having an intensity related to a respective one of the at least one electromagnetic property.” [See col. 20 lines 42-65 as one example of this teaching.] The same reasons for rejection, which apply to **claims 33,** also apply to **claims 37,** and need not be reiterated.

With respect to corresponding **Claim 38, and 94 Mills** teaches “measuring an impedance characteristic of at least one of the coils in the array. “ [See col. 12 lines 55-57; col. 20 lines 27-31; col. 56 lines 26-54.] The same reasons for rejection, which apply to **claims 33, 91** also apply to **claims 38, 94** and need not be reiterated.

With respect to corresponding **Claim 39 and 95, Mills** teaches “measuring an impedance characteristic includes an act of obtaining a measured impedance matrix of the array of coils.” [See col. 20 lines 27-65] The same reasons for rejection, which apply to **claims 33, 38, , 91, 94** also apply to **claims 39, and 95,** and need not be reiterated.

With respect to corresponding **Claim 40, and 96, Mills** teaches “obtaining a plurality of scattering parameters (S-parameters) of the array of coils” because the Magnetic susceptibility parameters which define and determine how the electromagnetic field fluctuates in space, represent a plurality of electromagnetic field scattering parameters.” [See the entire disclosure of **Mills** with respect to magnetic susceptibility and the parameters used to define, determine and measure it in the **Mills** reference. [See the abstract, figures 1a-13; col. 2 line 26 through col. 81 line 48.] The same reasons for rejection, which apply to **claims 33, 38, 91, 94** also apply to **claims 40, and 96,** and need not be reiterated.

With respect to corresponding **amended claims 44, 45 and original claims 100, 101; Mills** shows and teaches providing” (i.e. **claims, amended 44, 100**) “measuring the at least one property” (i.e. such as current or voltage or magnetic susceptibility) “in each of the other plurality of coils in the array. [See figures 1a, 1b, 8 and 13; col. 28

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lines 42-55 col. 30 line 50 through col. 32 line 46 as one example.] (i.e. **claims, Amended 45, 101**) “producing a current in each of the other plurality of coils in the array and measuring a voltage in each of the coils in the array, respectively, in response to the current.” [See figures 1a, 1b, 8 and 13; col. 28 lines 42-55 col. 30 line 50 through col. 32 line 46 as one example.]; The same reasons for rejection, which apply to **claims 33, 91** also apply to **claims 44, 45, 100, 101** and need not be reiterated.

With respect to corresponding **claims 46, 102; Mills** teaches “computing a trial impedance matrix from trial values of at least one of conductivity, permittivity and permeability for the at least one region of the body.” [See col. 19 line 23 through col. 32 line 46 with col. 4 lines 46-65 as one example.] The same reasons for rejection, which apply to **claims, 33, 38, 91, 94** also apply to **claims 46** and **102**, and need not be reiterated.

With respect to corresponding **Claim 47**, and **corresponding claims 47, 103: Mills** teaches and shows “computing values of the trial impedance matrix by solving Maxwell's equations” [see col. 178 line 47] with the trial values”. See col. 19 line 23 through col. 32 line 46 with col. 4 lines 46-65 as one example; as well as all of the various equations drawn from the Maxwell equations found throughout the entire **Mills** disclosure.] The same reasons for rejection, which apply to **claims 33, 38, 46, 91, 94, 102** also apply to **claims 47**, and **103**, and need not be reiterated.

With respect to corresponding **Claim 20**, and **corresponding claims 48, 104: Mills** shows the factors and parameters of the equation of this claim, via the numerous mathematics, equations, and array calculations set forth in the disclosure of col. 2 line 27 through col. 86 line 55 and figure 13 which teach the same principles in a long explanatory dissertation of mathematics. The same reasons for rejection, which apply to **claims 33, 38, 46, 47, 91, 94, 102, 102** also apply to **claims 48**, and **104**, and need not be reiterated.

With respect to corresponding **Claim 49** which depends from **claim 33, Mills** teaches from the disclosure section of Finite detector length, and the mathematics of the disclosure, the limitation of “computing the trial impedance matrix includes employing a finite difference time domain (FDTD) simulation of a model of the array and

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the body to compute a plurality of currents flowing in a plurality of coils in the array in response to a plurality of voltages and computing impedance characteristics from the plurality of currents and the plurality of voltages.” [See col. 57 line 6 through col. 81 line 14; and Figure 13.] The same reasons for rejection, which apply to **claims 33, 38, 46, 47, 91, 94, 102, 102** also apply to **claim 49**, and need not be reiterated.

With respect to corresponding **Claim 50**, and **105 Mills** teaches “comparing the trial impedance matrix with the measured impedance matrix”, from the teachings of col. 20 line 27-65; col. 19 line 44 through col. 20 line 31; col. 29 line 64 through col. 32 line 46; col. 56 lines 31-54, Figure 13]. The same reasons for rejection, which applies to **claims 33, 38, 46, 47 91, 94, 102, 103** also apply to **claims 50**, and **105**, and need not be reiterated.

With respect to corresponding **51, 52, 33, 106, 107, 108, Mills** teaches “iteratively updating “ (i.e. claims 25, 82, 107) ” in order to enable reducing a distance between the trial impedance matrix which is expressed as (i.e. susceptibility and detected in terms of voltage) and the measured impedance matrix” (i.e. the values actually detected) (i.e. claims 24, 51, 80) because Mills measures impedance for each of the antennas of the array in terms of detected signal voltage and brings the estimated and actual resulting voltages together. [See the teachings of col. 20 line 27-65; col. 19 line 44 through col. 20 line 31; col. 29 line 64 through col. 32 line 46; col. 56 lines 31-54]. Mills also shows mathematically that part of this method includes a least squares difference. [See the mathematical formulas provided throughout this reference connected with the taught reiterative, reconstruction method from the teachings of col. 20 line 27-65; col. 19 line 44 through col. 20 line 31; col. 29 line 64 through col. 32 line 46; col. 56 lines 31-54, figure 13] The examiner notes that the formulas are found throughout the text and in the appendices for each of the written described teachings, and not necessarily directly with the teachings themselves. Therefore applicant should refer to all the mathematics provided in the reference connected to the reconstruction algorithm employed by Mills.] The same reasons for rejection, which apply to **claims 33, 38, 46, 47, 49, 91, 94, 102, 102** also apply to **claims 51-53, and 106-108**, and need not be reiterated.

With respect to corresponding **Claims 54, and 109, Mills** teaches “forming an image of the body, the image having a plurality of voxels, each voxel of the plurality of voxels having an intensity based on corresponding trial values used to compute the final trial impedance matrix. [See col. 25 line 30 through col. 32 line 46; figures 8, 1a, 1b] The same reasons for rejection, which apply to **claims 33, 38, 46, 47, 49, 91, 94, 102, 102, 51-53, and 106-108**, also apply to **claims 54, and 109**, and need not be reiterated.

With respect to corresponding **Claims 55, 110, Mills** shows “providing a model of the array of coils and the body. [See figures 1a, 1b] The same reasons for rejection, which apply to **claims 33, 38, 54, 91, 94, 109** also apply to **claims 55, and 110**, and need not be reiterated.

With respect to corresponding **Claims 56, and 111, Mills** shows “logically partitioning a volume of space including at least a portion of the body into a plurality of regions”. [See figure 12] The same reasons for rejection, which apply to **claims 33, 38, 54, 55, 91, 94, 109, 110** also apply to **claims 56, and 111**, and need not be reiterated.

With respect to corresponding **Claims 57, and 112, Mills** teaches “assigning at least one of a conductivity value, a permittivity value, and a permeability value to each of the plurality of regions. [See col. 4 lines 46-51] The same reasons for rejection, which apply to **claims 33, 34, 38, 54, 55, 56, 91, 92, 94, 109, 110, 111** also apply to **claims 57, and 112**, and need not be reiterated.

With respect to corresponding **Claims 30, and corresponding claims 58, 87, 113, Mills** teaches “computing a trial impedance matrix from the assigned conductivity, permittivity and permeability values according to the model”. [See col. 4 lines 46-51 where permeability different than free space is defined as magnetic susceptibility, and see the teachings of col. 20 line 27-65; col. 19 line 44 through col. 20 line 31; col. 29 line 64 through col. 32 line 46; col. 56 lines 31-54, Figure 13]. The same reasons for rejection, which apply to **claims 33, 34, 38, 54, 55, 56, 57, 91, 92, 94, 109, 110, 111, 112** also apply to **claims 58, and 113**, and need not be reiterated.

With respect to corresponding **Claims 59, and 114, Mills** teaches “reducing a distance between the trial impedance matrix and the measured impedance matrix by iteratively adjusting trial values of the assigned conductivity and permittivity values”

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because he adjusting the magnetization voltages detected by each voxel. [See col. 4 lines 46-51 where permeability different than free space is defined as magnetic susceptibility, and see the teachings of col. 20 line 27-65; col. 19 line 44 through col. 20 line 31; col. 29 line 64 through col. 32 line 46; col. 56 lines 31-54, Figure 13]. The same reasons for rejection, which apply to **claims 33, 34, 38, 54, 55, 56, 57, 58, 91, 92, 94, 109, 110, 111, 112, 113** also apply to **claims 59, and 114**, and need not be reiterated.

With respect to **Claims 60, and 115**, **Mills** shows “performing a finite difference time domain simulation of the mode” [See figures 1c through figure 7, as examples with their corresponding description in the Mills disclosure. See also the plotting of the results col. 32 lines 43-46]. The same reasons for rejection, which apply to **claims 33, 34, 38, 54, 55, 56, 57, 58, 59, 91, 92, 94, 109, 110, 111, 112, 113, 114** also apply to **claims 60, and 115**, and need not be reiterated.

With respect to **Claim 41**, **Mills** shows from figures 1a and figure 8 by means of the drive mechanism and the electrical connection shown the step of “providing a current in at least one of the plurality of coils” (i.e. component 120) “and measuring the at least one property in at least one other of the plurality of coils” {see the abstract, figure 13, figure 8, figure 2 and the teachings of col. 20 line 27-65; col. 19 line 44 through col. 20 line 31; col. 29 line 64 through col. 32 line 46]. The same reasons for rejection, which apply to **claims 33, 38, 40, 91, 94, 96** also apply to **claim 41** and need not be reiterated.

With respect to **Claim 42**, **Mills** teaches “measuring a voltage in the at least one other of the plurality of coils” [See col. 31 line 62 through col. 32 line 46 as one example of this teaching in the Mills reference]. The same reasons for rejection, which apply to **claims 33, 38, 40, 41, 91, 94, 96** also apply to **claim 42** and need not be reiterated.

With respect to **Claim 43**, **Mills** teaches “measuring an **S1** [See objection to S11] parameter of the at least one other of the plurality of coils. [See the teachings of col. 20 line 27-65; col. 19 line 44 through col. 20 line 31; col. 29 line 64 through col. 32 line 46; col. 56 lines 31-54, Figure 13]. The same reasons for rejection, which apply to **claims 33, 38, 40, 41, 42, 91, 94, 96** also apply to **claim 43** and need not be reiterated.

With respect to **Claim 97, Mills** teaches impedance matching [See col. 20 lines 27-33, and shows a matching circuit and a network analyzer” from figures 13, 8, 1a, and 1b] The same reasons for rejection, which apply to **claim 96** also apply to **claims 70, 97** and need not be reiterated.

With respect to **Claim 98, Mills** shows from figures 8 and 13 “a third component adapted to provide a current in at least one of the plurality of coils and the first component is adapted to measure the at least one property in at least one other of the plurality of coils in response to the current. The same reasons for rejection, which apply to, **33, 38, 40, 91, 94, 95, 96** also apply to **claims 98** and need not be reiterated.

With respect to **Claim 99, Mills** shows from figures 1a, 1b, 8 and 13 “the third component includes an radio frequency (RF) power source. The same reasons for rejection, which apply to **claims 33, 38, 40, 91, 94, 95, 96** also apply to **claims 99** and need not be reiterated.

With respect to **Claim 116, Mills** teaches in the appendices of the Disclosure, the text of col. 11 line 34 through col. 82 line 14, and the exemplary reconstruction program of column 42 through 54 of the Mills Disclosure “at least one computer readable medium encoded with instructions; and at least one processor coupled to the at least one computer readable medium, the at least one processor configured to execute the instructions.” [See also figures 1a, 1b, and 8, which show the different computational processors 20, 126, 226, and 228] The same reasons for rejection, which apply to **claim 91** also apply to **claim 116** and need not be reiterated.

With respect to **Claim 117, Mills** teaches and shows in the appendices of the Disclosure, the text of col. 11 line 34 through col. 82 line 14, and the exemplary reconstruction program of column 42 through 54 of the Mills Disclosure “A computer readable medium encoded with instructions capable of being executed on at least one processor, the instructions, when executed by the at least one processor, performing a method of determining one or more properties of a body positioned proximate a coil array having a plurality of coils, the method comprising acts of: defining an electromagnetic model of the coil array, the electromagnetic model of the coil array capable of generating a trial impedance matrix that simulates the impedance response

of the coil array based on input electromagnetic properties assigned to a volume incorporated in the model; receiving an input including a measured impedance matrix of the coil array, the measured impedance matrix representing impedance measurements of the coil array obtained by operating at least one of the plurality of coils in the coil array; logically partitioning a volume associated with the model of the coil array and the body into a plurality of regions; assigning trial values respectively to each of the plurality of regions, the trial values representing initial guesses for values of at least one of ~~including at least one of~~ conductivity, permittivity and permeability for each of the plurality of regions; generating a trial impedance matrix from the assigned trial values according to the electromagnetic model of the coil array; and reducing a distance between the trial impedance matrix and the measured impedance matrix.”

With respect to **Claim 118**, **Mills** teaches and shows “generating the trial impedance matrix by implementing a finite difference time domain simulation of the model.” [See figures 1c through figure 7, and figure 13 as examples with their corresponding description in the Mills disclosure. See also the plotting of the results col. 32 lines 43-46]. The same reasons for rejection, which apply to **claim 117** also apply to **claim 118** and need not be reiterated.

With respect to **Claim 119**, **Mills** teaches and shows from the algorithms shown throughout the Mills reference that “the act of reducing the distance includes determining a least squares distance between the trial impedance matrix and the measured impedance matrix by iteratively updating the conductivity and permittivity values such that the trial impedance matrix is closer to the measured impedance matrix on each iteration” [See the mathematics’ and algorithms found throughout the **Mills** reference. . See also col. 4 lines 46-51 where permeability different than free space is defined as magnetic susceptibility, and see the teachings of col. 20 line 27-65; col. 19 line 44 through col. 20 line 31; col. 29 line 64 through col. 32 line 46; col. 56 lines 31-54, Figure 13]. The same reasons for rejection, which apply to **claim 117** also apply to **claim 119** and need not be reiterated.

Prior Art

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

***A) Sekihara et al.**, US patent 5,426,365 issued June 20th 1995.

B) Sodickson et al., US patent application publication 2006/ 0125475 A1 published June 15th 2006, which is applicant's own publication of the instant application, which is noted for purposes of a complete record only.

Conclusion

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is: (571) 272-2241. The examiner can normally be reached on Monday, Wednesday, and Friday-Thursday from 7:00am to 2:10 pm., and on Tuesday and Thursday from 7:00am to 5:30pm.

20. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Diego Gutierrez**, can be reached at (571) 272-2245. The **only official fax phone number** for the organization where this application or proceeding is assigned is **(571) 273-8300**.

21. Information regarding the status of an application may be obtained from the Patent Application information Retrieval (PAIR) system Status information for published applications may be obtained from either Private PMR or Public PMR. Status information for unpublished applications is available through Private PMR only. For more information about the PMR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PMR system contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/TAF/
March 19, 2009

/Brij Shrivastav/
Primary Patent Examiner
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